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To the Bell Operating Companies:

This report, and the accompanying volume of appendices, describe our independent review of Bellcore's Switching Cost Information System (SCIS) and U S WEST's Switching Cost Model (SCM). Redacted and unredacted versions of the report will be filed under protective cover with the Federal Communications Commission as required by the SCIS Disclosure Order.

Throughout the review, we have attempted to understand and respond to the needs for information of the various interested parties to the FCC's ONA tariff proceeding. We trust that our report provides information that will be useful to an informed debate of the issues related to SCIS and SCM in this proceeding, yet adequately protects proprietary information from public disclosure.

We wish to express our appreciation for the cooperation extended to us during the course of our review by the staffs of the Bell Operating Companies and Bellcore.

Very truly yours,

*Arthur Andersen & Co.*

ARTHUR ANDERSEN & CO.

Copy to: Mr. James F. Britt  
Executive Director  
Bellcore

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# INDEPENDENT REVIEW OF SCIS/ SCM

## REPORT

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Report Number S

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## **1.0 Report Summary**

### **1.1 Background of Review**

The independent review of SCIS/SCM by Arthur Andersen was required by the Federal Communications Commission (FCC) as part of its Open Network Architecture tariff proceeding. SCIS and SCM are models used by the Bell Operating Companies (BOCs) to estimate switching system investments attributable to individual services and features. The BOCs used Bellcore's SCIS model to develop investment information to support tariffs for optional Basic Service Elements (BSEs) offered on an unbundled basis from Basic Serving Arrangements under their approved Open Network Architecture plans. U S WEST also used its own SCM model for certain BSEs.

SCIS and SCM contain information determined to be proprietary by Bellcore and the BOCs. The FCC issued the SCIS Disclosure Order to address the needs of intervenors to have access to tariff cost support material while at the same time protecting proprietary information from public disclosure. Among other provisions of the Order, the BOCs were required to engage an independent auditor to review and perform certain procedures on the unredacted SCIS/SCM models and portions of the BSE cost development in which the models were used. The independent auditor was to submit the results of its review to the FCC under protective cover.

### **1.2 Purpose and Scope of Review**

Arthur Andersen was selected by the BOCs to perform the independent review of SCIS/SCM required by the SCIS Disclosure Order. In addition to general guidance on the scope of the review provided by the FCC in the Order, input was received from other interested parties.

The review was not intended to be an "audit" as the term is defined by the accounting profession. Rather, certain procedures were performed which are described below in areas related to SCIS and SCM which necessarily involve access to proprietary information. The independent review of SCIS/SCM involved over 4,000 hours of work by Arthur Andersen professionals. The review encompassed four areas: evaluation of SCIS/SCM methodology, identification of study parameters subject to variation, sensitivity analyses and validation of SCIS/SCM aggregation methods.

## **Evaluation of SCIS/SCM Methodology**

A detailed review of the SCIS model, its architecture and information flow, underlying cost principles and specific methods was performed to enable Arthur Andersen to draw conclusions about the reasonableness of switching system investment estimates produced by the model. This evaluation involved extensive analysis of actual BSE investment calculations, underlying investment equations, model options and their implications, and model sensitivities to changes in key parameters. Arthur Andersen also reviewed in detail the model development process, software implementation and testing, ongoing support, documentation and training - all of which influence the reasonableness of the model for service costing.

A more limited review was made of SCM due primarily to its limited applicability in U S WEST's ONA tariff filing. The review of SCM focused primarily on how the model differs from SCIS and the significance of the differences.

## **Identification of Parameters Subject to Variation**

As model users, the BOCs have considerable model input options and costing choices under SCIS and SCM. The term **parameters** is used to describe all the software versions, costing choices, data assumptions and other factors which ultimately determine the service or feature investments estimated by the models. These parameters can create variation in model results.

Arthur Andersen identified all parameters subject to variation for four of the BSEs offered by the BOCs. Parameters which could potentially have a significant effect on model results were identified for subsequent analyses.

## **Sensitivity Analyses**

Four Basic Service Elements were independently selected by Arthur Andersen for comprehensive analyses of their costs. The selection criteria were based primarily on the number of BOCs which offered the feature and the amount of projected revenues. BSEs selected were:

- o Multiline Hunt Group Uniform Call Distribution Line Hunting (BSE AD)
- o Calling Billing Number Delivery (BSE-J)
- o Multiline Hunt Group (BSE W)
- o Make Busy Key (BSE R)

A series of sensitivity analyses was performed for each BSE to determine the parameters which contributed to differences among BSE costs filed by the BOCs. Arthur Andersen sought to determine, for example, how much differences in rate design, costing methodology or data assumptions contributed to the wide range in BSE costs. Table 1A shows each company's costs for the four BSEs and indicates the extent of their variability.

**Table 1A**

BOC	AD	J	W	R
Ameritech	\$19.56	\$ .001491	\$13.44	\$47.16
Bell Atlantic	\$12.48	\$ .000287	\$1.08	\$776.16
BellSouth	\$5.91	\$ .000060	\$1.82	
New England Tel	\$1.44	\$ .000858	\$ .73	
New York Tel	\$3.26	\$ .001138	\$2.08	
Nevada Bell	\$1.51	\$ .000134	\$1.12	
Pacific Bell	\$26.41	\$ .000331	\$1.73	
Southwestern Bell	\$0.01	\$ .000077	\$ .16	\$80.54
U S WEST	\$12.34	\$ .000103	\$1.85	\$26.29

Sensitivity analyses are a comparison of the results obtained from applying SCIS/SCM based on the actual parameter values used by each BOC and the results which would be obtained when BOC averages or norms are substituted. Results are stated in terms of the effects of the parameter change on total direct recurring costs which are publicly disclosed in the Tariff Review Plans (TRPs) filed by the BOCs. The sensitivity analyses enable interested parties to determine the contribution of differences in each of the parameters to the overall variation in total direct recurring costs among the BOCs.

A second series of sensitivity analyses was used to determine which parameters can most significantly affect model results and the sensitivity of model investment estimates to changes in these parameters within reasonable ranges.

In total, Arthur Andersen performed over 170 sensitivity analyses.

#### **Validation of SCIS/SCM Aggregation Methodologies**

Arthur Andersen determined the methods used by the BOCs to weight and aggregate investments and annual costs across technologies and states in multi-state companies. An assessment was made as to the reasonableness of the methodologies and weighting factors used by each of the BOCs. This required evaluating each BOC's aggregation approach for consistency with principles of cost causation.

### **1.3 Description of SCIS/SCM**

#### **SCIS**

SCIS is a PC-based model developed and maintained by Bellcore and used by the BOCs and other telephone companies to estimate switching system investment caused by switch usage. Measures of usage can be telephone lines terminated, call attempts, central processor milliseconds, CCS (hundred call seconds of call duration), etc. SCIS computes two types of investment using the marginal cost and average cost methods.

SCIS uses a building block approach by dividing a switching system into functional categories, assigning each switch equipment component to one or more categories and developing an investment per unit of use of the function. Figure 1A illustrates generic switch functions and their typical measures of usage. Using this approach, investment is attributed to services and features, such as the ONA BSEs, based upon their usage of switching system functions.

SCIS models have been developed for nine switching systems. The models are designed based upon manufacturer - provided switch engineering rules, capacities and prices.

SCIS supports cost development for Residence/Business features, Centrex and other vertical services. The model was used extensively in the BSE cost development by the BOCs. U S WEST also used their own SCM model and special studies for several BSEs. A summary of the cost models and special studies used by U S West are shown in Table 6A.

### **SCM**

SCM was developed and is maintained by U S WEST for its service cost studies. It is similar to SCIS in many respects:

- o Based upon long run incremental cost and average cost methods.
- o Uses a bottoms-up, functional approach for attributing switching system investment to services and features according to cost causation.
- o Models actual offices based upon switch technology, size, usage characteristics and configuration.

SCM was developed in the mid-1980's and has been used extensively by U S WEST since 1989.

### **1.4 Basic Service Element Cost Development**

Figure 1B illustrates the overall process used by the BOCs to develop BSE unit investments and total direct annual costs as filed in the TRPs. This particular process diagram reflects the use of SCIS.

The process flows from the development of the basic switching system unit investments by technology and jurisdiction in the SCIS Model Office Module to the development of the investments attributable to providing the BSEs based upon estimated switch usage in the SCIS Feature Module. Investment loadings are then added to account for other plant items, such as central office power and common equipment, capitalized telco engineering and labor, etc.

Annual costs are computed by applying annual charge factors to the loaded investments. The annual charge factors are for capital costs (depreciation, cost of money and income taxes) and operating expenses (maintenance, administrative expenses and other operating taxes). Finally, the annual costs by technology and state are weighted based upon access lines, minutes of use or another demand variable and aggregated to yield a single annual cost figure for use on the TRP.

Figure 1A

## Generic Switch Functions - Any Switch

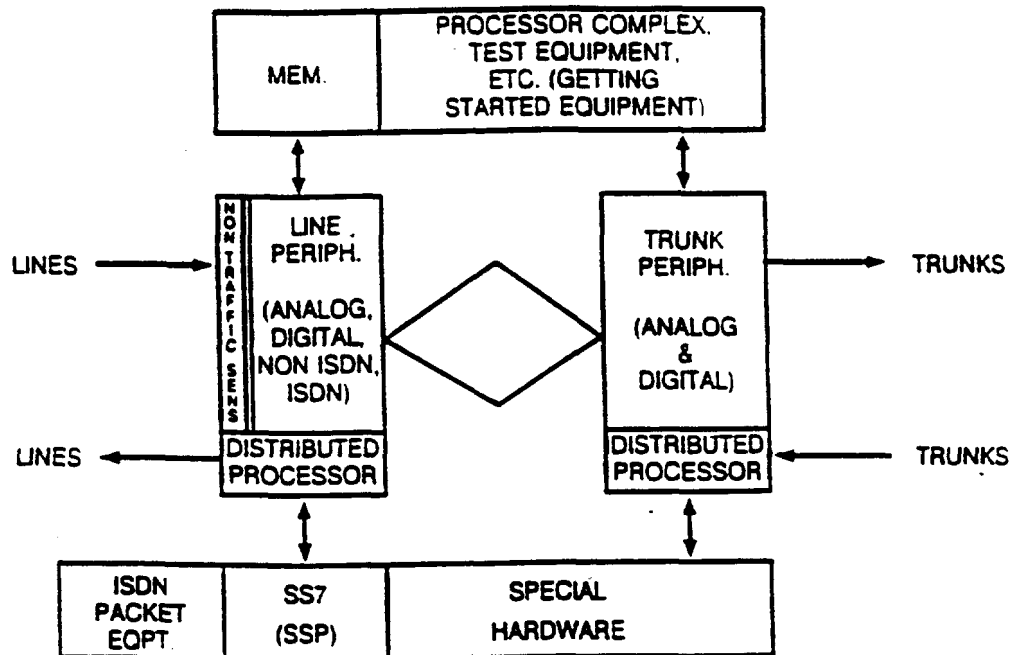
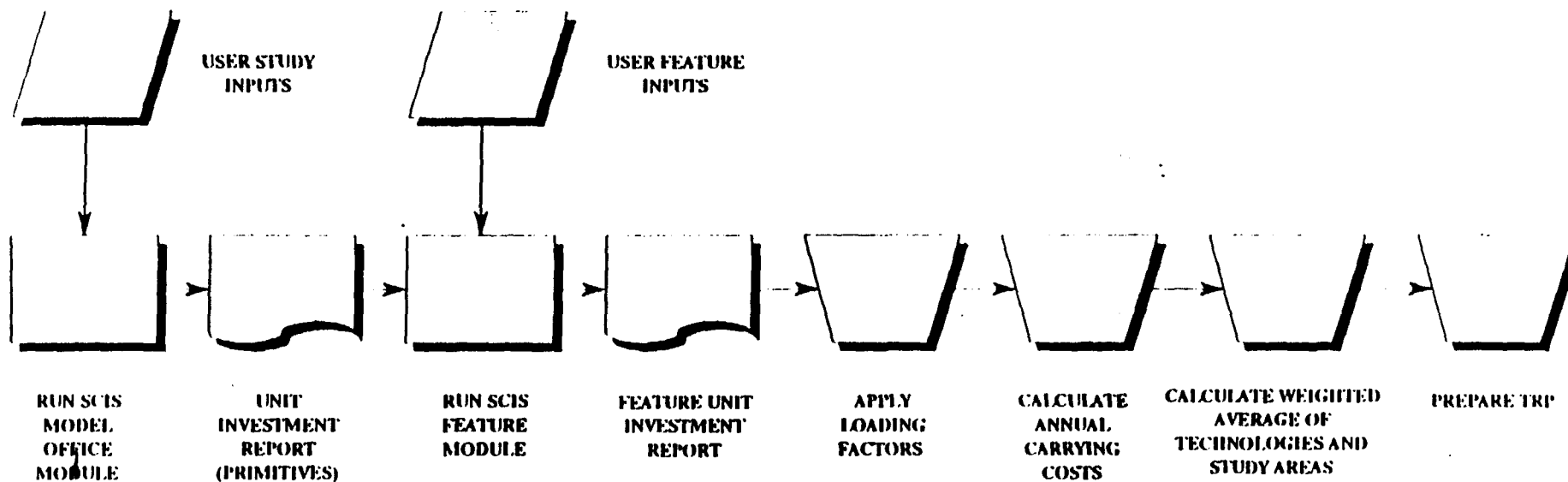


Figure 1B

**OVERALL COST DEVELOPMENT FLOW**  
**USING SCIS MODEL**





## **1.5 Results of Review**

The significant findings and conclusions with respect to each of the four areas of the review are summarized in the following sections.

### **Evaluation of SCIS/SCM Methodology**

#### **SCIS**

After conducting an extensive review, Arthur Andersen has concluded that the SCIS model is fundamentally sound and provides reasonable estimates of switching system investment attributable to service and feature usage of the switch.

- o The costing principles inherent in SCIS are appropriate for estimating long run incremental investments attributable to switching system usage, and the specific methods for implementing these principles are reasonable.
- o SCIS accurately estimates the cost of actual switching systems engineered according to manufacturer engineering rules as evidenced by Bellcore's validation procedures and results.
- o Extensive software development controls and testing are used to assure SCIS models are properly implemented and installed by model users.
- o Finally, although SCIS is a complex model requiring considerable understanding of switching systems and service costing, the model documentation, training and technical support are adequate to provide reasonable support for the model in use.

#### **SCM**

Based upon reviews of the model and its documentation, and comparisons of SCIS and SCM methods and results, Arthur Andersen also has concluded that SCM provides reasonable estimates of switching system investments attributable to services and features. This conclusion is reached recognizing that there are methodological differences between SCM and SCIS, but the rationale for different costing approaches are substantiated and reasonable. The differences represent alternative interpretations of long run, future switch engineering, rather than differences in costing principles.

Arthur Andersen observed, though, that perhaps due to fewer resources in support of the SCM model, there are weaknesses in its documentation and operation, and the extent to which it is kept up-to-date with vendor changes in switching systems.

## Identification of Parameters Subject to Variation

There are numerous parameters subject to variation by the BOCs as users of SCIS/SCM. These parameters vary by technology or switch type and BSE feature.

Section 6.2 of the report provides a detailed listing of SCIS parameters subject to variation for each switch technology, and identifies parameters relevant to the four BSEs analyzed by Arthur Andersen.

This information provides users of the report with a comprehensive understanding of the factors which potentially can affect BSE unit investments and total direct annual costs. The model parameters identified as consistently having the most significant effect on BSE investments and annual costs were:

- o **Use of marginal or average costing** - These two costing methods produce significantly different feature investments and annual costs. Seven of nine BOCs used average costing, and two companies used marginal costing.
- o **Model Software Version** - Switch vendors release at least one generic software update per year for each technology. As switching system architectures and pricing changes, investment functions change as well. To the extent that companies used significantly different model software versions, differences in investment estimates resulted.
- o **SCIS/SCM model version** - Bellcore also issues three to four SCIS software updates per year for each switch technology. The updates usually coincide with the release of new switch generic software but can also be related to other changes in the model. These changes may further contribute to cost differences among BOCs.
- o **"Material only" versus "engineered, furnished and installed" options** - SCIS users have the option of loading vendor charges for engineering and installing switches on the material price of switch equipment. Alternatively, such loadings to arrive at installed investment can be done after SCIS. Depending upon when EF&I loadings are applied, model output will be different.
- o **Wide array of company-specific data assumptions** The levels of switch vendor discounts, feature usage, processor utilization and host/remote switch configurations have significant effects on model investment estimates. The significance of these parameters is dependent on the switch technology and feature being modeled. Therefore it is difficult to generalize about the importance of any single parameter for all BSEs.

In addition to these model parameters, there are other study parameters outside of SCIS, such as investment loading factors, annual charge factors and technology weightings, which affect BSE costs. These as well as model parameters were evaluated in the sensitivity analyses.

### **Sensitivity Analyses**

The degree of uniformity of study parameters among the BOCs has been an issue throughout the ONA tariff proceeding. The first type of sensitivity analyses performed by Arthur Andersen, substitution of average for actual parameters, was used to identify the causes of variances in BSE total direct recurring costs among the companies.

To facilitate discussion about causes of BSE cost variability and the issue of parameter uniformity, Arthur Andersen sought to categorize reasons for differences in a meaningful way. Broadly speaking, differences in study parameters among the BOCs come from one of the following three sources:

**Source 1** - These are differences in indigenous cost structure or operating characteristics. Examples include the actual mix of switch technologies, switch vendor discounts and switching system sizes, configurations, etc.

**Source 2** - These are differences that arise from estimated study data where **substantial judgment** is involved rather than actual or realized results from previous experience. Examples are feature usage or parameters where there is limited historical information upon which to base estimates.

**Source 3** - Finally, these are methodological differences based upon user preferences in areas such as costing principles (marginal versus average costing) and time periods assumed for technology weightings (past or future).

As mentioned previously, approximately 170 individual sensitivity analyses were performed. Describing the results of the analyses is overwhelming without some summarization, so the sensitivity analyses and their results were summarized in the following six categories. Each represents a generic category of differences in BSE costs.

**Rate design** - In reviewing the cost support for some BSEs, there were several instances of inconsistent rate design. The Tariff Review Plan attempted to provide the companies with standard names and categories for the numerous BSE offerings. However, there remained a number of cases where either the services offered by the BOCs for the same BSE were not functionally equivalent or the features were tariffed and costed on different bases. An example of the first case is the inclusion of queuing with multiline hunt group uniform call distribution, and an example of the second is filing rates on a per group basis rather than per individual line. This category of differences is considered to be due to Source 3, methodological differences.

**Software version** - Switch manufacturer generic software releases of different vintage were used by the BOCs as well as different releases of the SCIS model. These also are considered to be differences from Source 3 except in special situations where a BOC had decided not to purchase a generic software update perhaps because the switch technology was being phased-out. In this case, the difference is from Source 1, real differences in cost structure or operating characteristics.

**Costing principles** - The choice between marginal and average costing is the primary example of parameter differences in this category. This is a Source 3 difference.

**Technology weighting** - The mix of switch technologies creates significant differences in BSE costs among the BOCs. These differences generally arise from Source 1; however, they also could, in part, be related to Source 3 depending on the timeframe used to measure technology mix (past versus future).

**Data assumptions** - Difference in data assumption such as feature usage characteristics, cost of money, etc. are the most difficult to categorize. Many data items are subject to considerable uncertainty (Source 2), while others are more definitive (Source 1). Since the effect of particular data assumptions varies from BSE to BSE, it is necessary to evaluate key data items and their effect on cost variability on a case-by-case basis.

**Post-SCIS/SCM processes** - Differences that arise from post-SCIS/SCM processes such as the application of certain loading factors and the conversion of SCIS/SCM output to annual charges could potentially come from any of the three sources.

Figures 1C-1F on the following page, summarize the sensitivity analyses results for each of these six categories. Arthur Andersen used a measure of statistical variance to quantify the contribution of differences in parameter values to overall BSE cost differences. Variance is a common statistical measure computed by summing the squares of the difference between individual values and their average, and then dividing by the number of values.

$$\text{Variance} = \frac{\sum_{i=1,n} (x_i - \text{average})^2}{n}$$

$x_i$  = individual value

$n$  = number of values

Greater disparity in individual values results in a larger variance estimate.

As illustrated in Figure 1C, the variance of the feature costs from Table 1A for Multiline Hunt Group UCD Line Hunting is \$83. When the variability in costs due to rate design differences were removed from the BSE costs the variance decreased to \$66 or by 20%, indicating that rate design differences are significant.

It is important to note that subsequent sensitivity analyses were performed on the rate design-adjusted BSE costs. This was because rate design differences in some cases produce extraordinary differences in costs. For subsequent sensitivity analyses to be meaningful this effect had to be eliminated.

Continuing with Figure 1C, the variance after adjusting for different software versions is \$57 versus \$66. This indicates the software version differences were not particularly important for this BSE. Instead, costing principles (marginal versus average costs), technology weighting and post SCIS/SCM processes were the key contributors to cost variability. The reason that variance increased after adjusting for differences in these parameters is that they tended to mitigate what would have otherwise been even greater differences in BSE costs due to data assumptions. The detailed support for each figure is contained in Appendices 22-25.

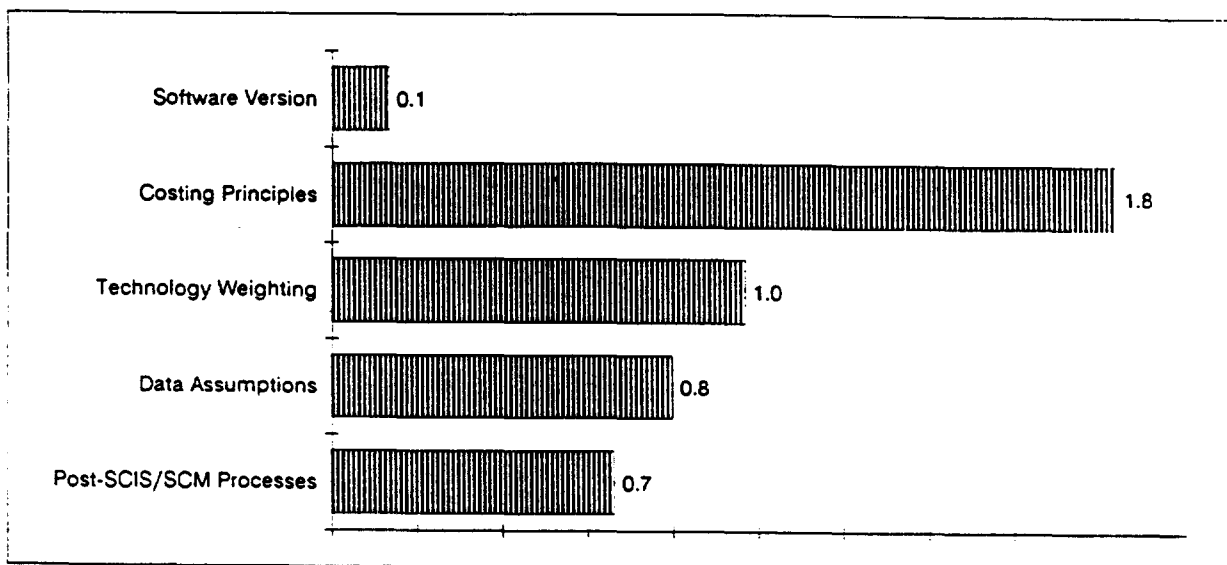
Figures 1G-1J take the same statistical variances and provide an indication of the relative importance of each category in explaining the overall BSE cost variability. The relative importance measures are calculated simply by subtracting the cost variance adjusted for rate differences from the cost variances adjusted for each of the other categories, and then dividing this amount by the variance adjusted for rate design. There is no relative importance measure for rate design since it serves as the baseline.

For example, the relative importance of costing principles in Figure 1G is 1.8, calculated by subtracting the \$66 variance adjusted for rate design from the \$187 variance adjusted for costing principles, and dividing this amount (\$121) by \$66. By studying Figures 1G-1J, some overall observations become apparent. Arthur Andersen has summarized these in Table 1B.

## RELATIVE IMPORTANCE OF STATISTICAL COST VARIANCES

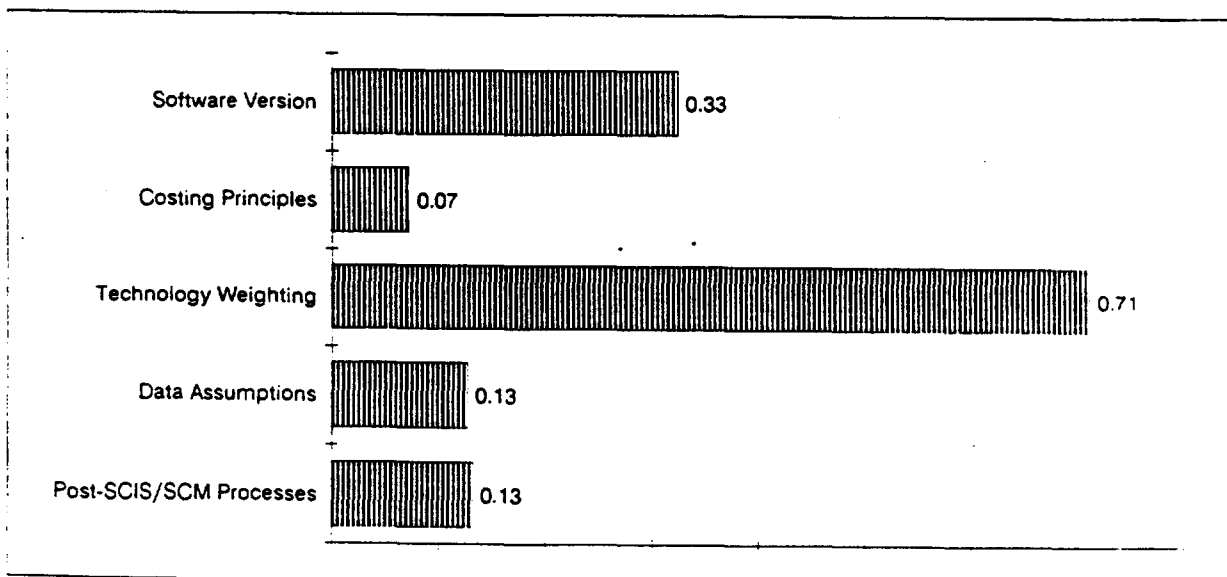
### MULTILINE HUNT GROUP UCD LINE HUNTING (TRP 'AD')

Figure 1G



### CALLING BILLING NUMBER DELIVERY (TRP 'J')

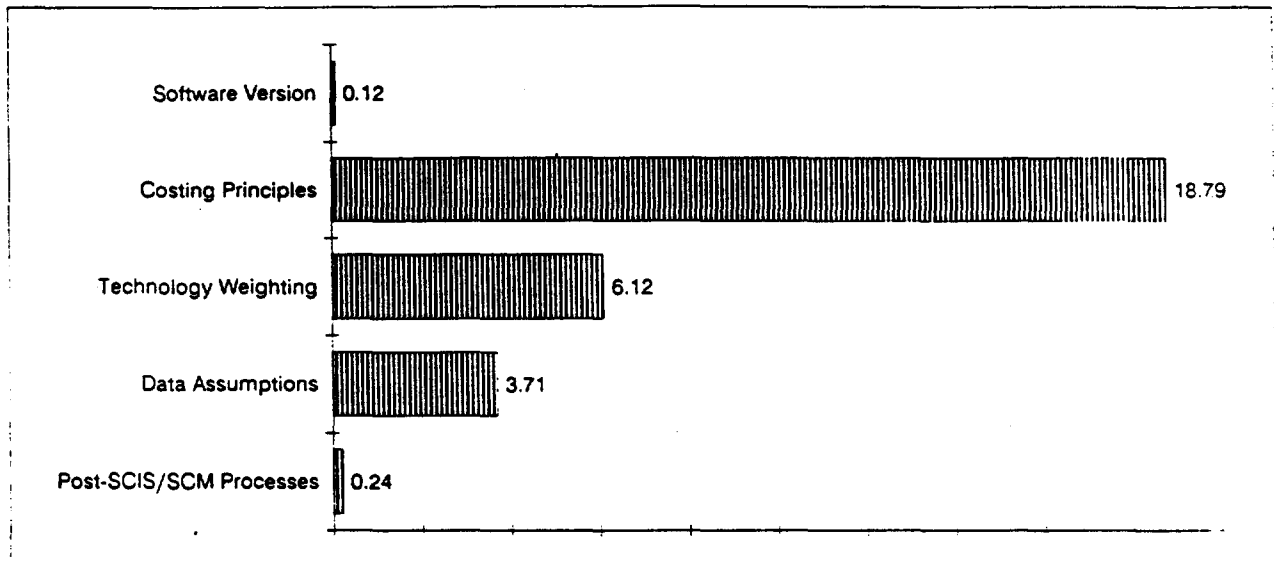
Figure 1H



## RELATIVE IMPORTANCE OF STATISTICAL COST VARIANCES

### MULTILINE HUNT GROUP (TRP 'W')

Figure 1I



### MAKE BUSY KEY (TRP 'R')

Figure 1J

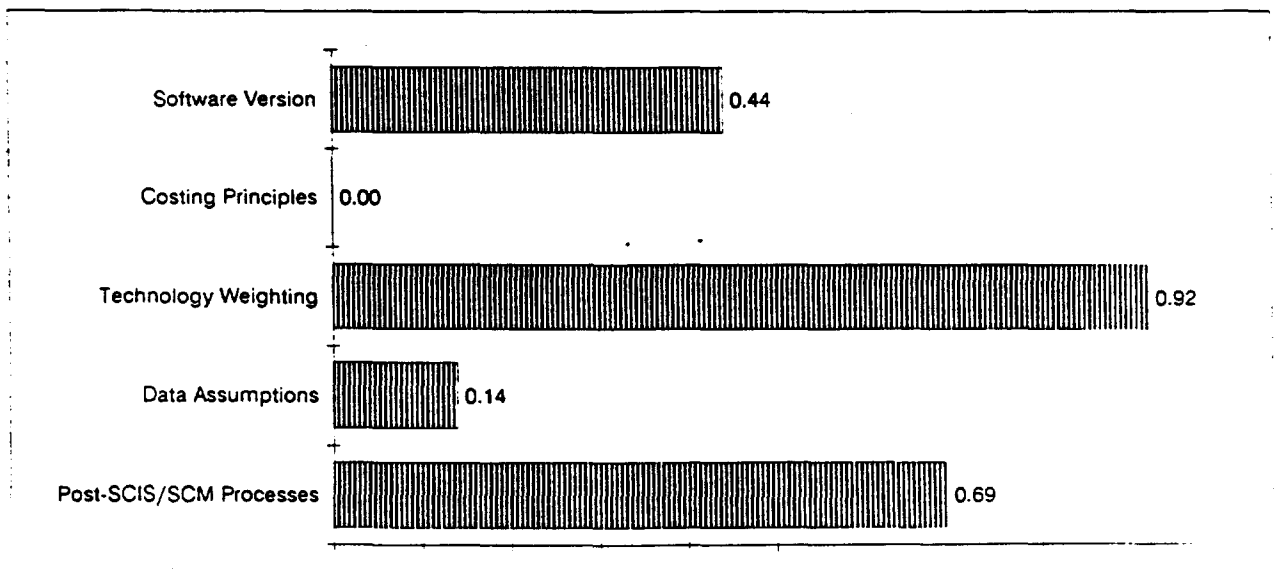


Table 1B

SENSITIVITY ANALYSIS OBSERVATIONS	
1.	The relative importance of a specific parameter, or category of parameters, can be quite different depending on the Basic Service Element. For example, costing principles (marginal versus average costs) are a significant parameter for two BSEs, but have less effect on Calling Billing Number Delivery and no effect on Make Busy Key. Calling Billing Number Delivery and Make Busy Key rely more upon special hardware than the central processor of the switch. The central processor is a primary investment component affected by the distinction between marginal and average costing.
2.	Rate design differences account for several wide cost variations among the BOCs. These differences are relatively straightforward and can be readily adjusted to restate the affected costs on a comparable basis.
3.	The vintage of software versions can be a very significant factor, especially in cases where a substantive change in switch configuration was made by the vendor from one release to the next. For example, a switch software change that moves from centralized to decentralized processing can have a very significant effect on the cost of certain BSE features. The use of model versions with old vendor prices also has an impact on investment estimates.
4.	Technology weighting is a consistently important factor contributing to the variation in costs among the BOCs. Sensitivity analyses indicate that the time perspective used (past versus future) affects technology weighting. Another factor is the underlying differences among the BOCs in their choice of switch technologies. Technology weighting is important because of differences in feature annual costs when provided via different switch models. These differences in technology cost vary among BSEs depending on the switch functions they require. For example, one switch model had the <i>highest</i> annual cost for one BSE yet had the <i>lowest</i> cost for another.
5.	Data assumptions are a significant parameter category, but typically there are only a few individual data assumptions that materially affect total direct annual costs for any BSE. There was considerable variation in some of the demand-related data assumptions by the BOCs. The importance of this variability can only be determined from sensitivity analyses performed for each BSE.
6.	Post-SCIS/SCM processes account for a substantial portion of the overall variation in total direct recurring costs. Arthur Andersen quantified these effects for comparative purposes but did not attempt to determine the source of differences in the data and methodologies used.



The second series of sensitivity analyses determined the "key levers" which affect model investment estimates and the extent to which unit investments might be different over reasonable ranges. In addition to Arthur Andersen's findings regarding the importance of marginal versus average costing, the following model parameters were identified as having the most potential impact on model results:

- o EF&I versus Material Prices
- o Vendor Discounts
- o Processor Utilization Factor
- o Cost of Money
- o Peak to Average Busy Hour Factor
- o Remotes versus No Remotes

Each parameter's effect on model results is described in Section 6.32.

#### **Validation of SCIS/SCM Aggregation Methodologies**

The methodologies used by the BOCs to aggregate SCIS/SCM technology-specific output are generally reasonable and consistent with principles of cost causation. Aggregation is done at different stages of the overall cost development process by individual companies; however, these differences are not particularly significant to the end result.

Weighting of technologies usually is done on the same basis as the rates (i.e., per line in most cases). In those instances noted where a BOC designed its tariff for a BSE in a way that was inconsistent with other companies, there was a corresponding difference in the basis used for weighting technologies. In general, however, different choices for technology weightings would not be expected to produce significantly different results in total direct recurring costs.

## 2.0 Background of Review

The independent review of SCIS/SCM by Arthur Andersen has its genesis in the FCC's Open Network Architecture (ONA) proceeding. To place the review in context, this section of the report will briefly describe:

- o The relevant background of ONA
- o How SCIS/SCM applies to the ONA tariffs
- o The proprietary disclosure issues related to SCIS/SCM
- o How the independent review relates to the SCIS/SCM disclosure issues

## 2.1 Open Network Architecture

ONA is a regulatory policy framework adopted by the FCC to enable enhanced service providers to gain unbundled and equal access to the networks of local exchange carriers. The FCC has made ONA a precondition to the removal of the Computer Inquiry II structural separation requirements for enhanced services offered by the BOCs.

The BOCs have filed ONA plans with the FCC. These plans, among other things, describe the unbundled services that each BOC intends to offer to meet the goals of ONA. ONA services consist of the following categories:

**Basic Serving Arrangements (BSAs)** are the fundamental tariffed switching and transport services that allow enhanced service providers to connect with customers through the BOCs' networks.

**Basic Service Elements (BSEs)** are optional, unbundled features that an enhanced service provider may obtain from the BOCs in order to offer an enhanced service.

**Complementary Network Services (CNSs)** are optional, unbundled basic service features that an end user may obtain from the BOCs in order to access or receive an enhanced feature.

**Ancillary Network Services (ANSs)** are other nonregulated services that BOCs offer that may be used by enhanced service providers.

## 2.2 ONA Tariffs

On November 1, 1991, each of the BOCs except Ameritech filed tariffs with the FCC for ONA services which unbundled existing interstate access charge tariffs. Ameritech had previously filed its ONA tariffs on December 18, 1990 prior to the FCC's modification of the Part 69 access charge rules to incorporate ONA.

The Part 69 access charge rules adopted by the FCC call for a flexible, cost-based approach to pricing new or newly unbundled ONA services. For BSEs, which are considered new service offerings under the FCC's price cap rules, the BOCs are required to:

- o Demonstrate that an overall "net revenue test" is met for ONA services
- o Identify direct costs for each BSE
- o Include an appropriate level of overhead costs for each BSE
- o Provide ratios of direct unit cost to unit investment and direct unit cost to unit price for each BSE

Table 2A lists the FCC's uniform BSE descriptions and indicates the BSEs offered by each of the BOCs.

Table 2A

## ONA BSEs FILED BY THE BELL OPERATING COMPANIES

TRP Category	BSE NAME	AM	BA	BS	NET	NYT	NV	PAC	SWB	USW
A	Alternate Routing				X	X			X	**
B	Answer Supervision W/ Line Side Interface	X	X							X
C	Automatic Protection Switching									
D	Bridging									
E	Call Denial							X		
F	Call Detail Recording Reports	X								
G	Called Directory Number Delivery via 900NXX	X								
H	Called Directory Number Delivery via DID									X
I	Called Directory Delivery via ICLID									
J	Calling Billing Number Delivery	X	X	X	X	X	X	X	X	X
K	Carrier Selection on Reverse Charge Multiline Hunt Group									
L	Conditioning									
M	DID Trunk Queing									X
N	Fast Select Acceptance									
O	Faster Signalling on DID			*						
P	Flexible ANI Information Digits	**								
Q	Line Monitor Service		X							
R	Make Busy Key	X	X	*					X	X
S	Message Desk (SMDI)	X	X	X						
T	Message Desk (SMDI) Expanded	X								
U	Message Waiting Indicator - Activation (Audible)	X								
V	Message Waiting Indicator - Expanded	X								
W	Multiline Hunt Group	X	X	X	X	X	X	X	X	X
X	Multiline Hunt Group Circular	X	X							
Y	Multiline Hunt Group CO Announcement	X			X	X		X	X	X
Z	Multiline Hunt Group Individual Access to Each Port	**	**	X			**	**		
AA	Multiline Hunt Group Overflow	X						**		
AB	Multiline Hunt Group Preferred	X	X							
AC	Multiline Hunt Group UCD with Queing	X		*	X	X		X	X	X
AD	Multiline Hunt Group Uniform Call Dist Line Hunting	X	X	X	X	X	X	X	X	X
AE	Network Reconfiguration							X		
AF	Reverse Charge Acceptance									
AG	RPOA Preselection									
AH	Secondary Channel Capability									
AI	Service Code Denial							X		
AJ	Statistical Multiplexer									
AK	Tandem Routing									
AL	Three Way Call Transfer	X	X	*				X		X
AM	Three Way Calling		X		****	X				X

Table 2A

## ONA BSEs FILED BY THE BELL OPERATING COMPANIES

TRP Category	BSE NAME	AM	BA	BS	NET	NYT	NV	PAC	SWB	USW
AN	Uniform Seven-Digit Access Number Remote Call Forward									
AO	800 Service to DID			*						
AP	Other BSE			***	***				***	***
AQ	Other BSE			***	***					***
AR	Other BSE				***					***
AS	Other BSE				***					***
AT	Other BSE				***					***
AU	Message Delivery Svc MDS Arrangement									X
AV	Message Delivery Svc Call Data Per Line									X
AW	Queueing With UCD Std Announcement Per Que Slot									X
AX	DID Trk Queueing Per Que Slot in Group									X
AY	DID Trk Queueing Std Announcement Per Announcement									X
AZ	DID Trk Queueing Std Announcement Per Que									X
BA	Traffic Data Reports Ongoing Per Month									X
BB	Call ID - Bulk Called Data I/O CO Facility									X

## CHART SYMBOLS:

- X** Rates were filed for this BSE.
- \*** BellSouth did not file rates for this BSE but instead filed rates for the individual rate elements which comprise the BSE.
- \*\*** The rates filed were zero.
- \*\*\*** The BSE filed for this category varies by BOC.
- \*\*\*\*** The rate filings for this BSE are listed in one or more of the "Other BSE" categories (AP, AQ, AR, AS, AT).

## 2.3 Applicability of SCIS/SCM

The FCC provided a uniform Tariff Review Plan (TRP) format and specified the cost support that must accompany the ONA tariff filings. Among the required cost support material is the following:

*...provide engineering studies, time and wage studies, or other cost accounting studies to identify direct costs, absent overheads, including costs for a representative 12-month period, demand and revenue changes including cross elastic effects, and supporting workpapers...*

The Switching Cost Information System (SCIS), a complex costing model developed and maintained by Bellcore, was used by the BOCs to determine switch-related direct unit investment costs for BSE offerings. U S WEST also used its own Switching Cost Model (SCM) to derive direct unit costs for certain BSEs. Table 2B shows the cost models utilized by U S WEST to develop the direct unit costs for each of its BSE offerings.

Table 2B

COST MODEL(S) USED BY U S WEST FOR ONA FILING		
TRP Category	BSE NAME	COST MODEL USED
B	Answer Supervision W/ Line Side Interface	Special Study
H	Called Directory Number Delivery via DID	SCM - Core and Features
J	Calling Billing Number Delivery	SCM Core - DMS; Special Study - Features
M	DID Trunk Queing	SCIS - Model Office and Features
R	Make Busy Key	SCIS - Model Office and Features
W	Multiline Hunt Group	SCM - Core and Features
Y	Multiline Hunt Group CO Announcement	SCIS - Model Office and Features
AC	Multiline Hunt Group UCD with Queing	SCIS - Model Office and Features
AD	Multiline Hunt Group Uniform Call Dist Line Hunting	SCIS - Model Office and Features
AL	Three Way Call Transfer	SCM - Core and Features
AM	Three Way Calling	SCM - Core and Features
AP	Other BSE- Caller ID- Bulk Per Multiline Hunt Group	SCIS - Model Office; Special Study - Features
AQ	Other BSE- Caller ID- Bulk Per Call Record	SCIS - Model Office; Special Study - Features
AR	Other BSE- Call Forwarding Variable	SCM - Core and Features
AS	Other BSE- Caller ID- Ind. Per Line	SCM - Core and Features
AT	Other BSE- Message Delivery Service Call Data I/O Central Office Facility	SCIS - Model Office and Features
AU	Message Delivery Svc MDS Arrangement	SCIS - 1AESS; Special Study - 5ESS
AV	Message Delivery Svc Call Data Per Line	SCIS - Model Office and Features
AW	Queueing With UCD Std Announcement Per Que Slot	SCIS - Model Office and Features
AX	DID Trk Queueing Per Que Slot in Group	SCIS - Model Office and Features
AY	DID Trk Queueing Std Announcement Per Announcement	SCIS - Model Office and Features
AZ	DID Trk Queueing Std Announcement Per Que Slot	SCIS - Model Office and Features
BA	Traffic Data Reports Ongoing Per Month	Special Study
BB	Call ID - Bulk Called Data I/O CO Facility	SCIS - Model Office; Special Study - Features

## 2.4 Disclosure Issues

The BOCs filed petitions for waiver of the FCC's requirement to file cost support related to SCIS/SCM on the grounds that such information was proprietary. In particular, two areas of concern were cited:

- o The SCIS and SCM models contain information about the design, operation and prices of specific switch models. Such information is deemed to be competitively sensitive by the affected switch vendors (AT&T and Northern Telecom).
- o The models themselves are considered to be the intellectual property of Bellcore and U S WEST. They believe that disclosure of certain proprietary information about the design of the models could enable other interested parties to develop competing models.

The FCC performed an in camera (i.e., protected from public disclosure) review of SCIS and concluded that the model does, in fact, contain competitively sensitive information.

## 2.5 SCIS Disclosure Order

On January 31, 1992, the FCC released the SCIS Disclosure Order which addressed issues pertaining to the disclosure of proprietary information contained or inherent in the SCIS and SCM models. The FCC attempted to balance the sometimes conflicting interests of third party intervenors and the BOCs concerning access to proprietary information.

The SCIS Disclosure Order required the following:

- o The BOCs were to file SCIS/SCM software and related documentation with designated proprietary information redacted (i.e., deleted). This redacted information was also to be provided to those intervenors who signed a specified nondisclosure agreement.
- o The BOCs were to engage an independent auditor to perform certain procedures with respect to the unredacted SCIS/SCM software and documentation. The independent auditor was to submit the results of its review to the FCC under protective cover.
- o Intervenors were to submit queries to the FCC which were to be directed to the independent auditor for response.

The purpose and scope of the independent review of SCIS/SCM are discussed in the next section of this report.

### 3.0 Purpose and Scope of Review

This section of the report will describe the purpose and scope of the independent review of SCIS/SCM performed by Arthur Andersen. The FCC's requirements for the review set forth in the SCIS Disclosure Order will be discussed along with relevant background information about the scope and approach taken by Arthur Andersen to fulfill these requirements.

### 3.1 SCIS Disclosure Order Requirements

Paragraph 66 of the SCIS Disclosure Order directed the BOCs to select a single independent auditor to perform an independent review of SCIS. U S WEST was permitted to select the same or a different auditor to conduct a review of SCM. The BOCs collectively selected Arthur Andersen to review both SCIS and SCM.

The Order described the intended purpose and required scope of the independent review in only general terms. Paragraph 72 of the Order states:

*This audit should include a validation of the SCIS model's methodology, a list of parameters subject to BOC variation, and a validation of the method used by each BOC to convert technology-specific SCIS output reports into aggregated outputs.*

Arthur Andersen submitted a "Proposed Work Plan for Independent Review of SCIS/SCM" to the FCC as required by Paragraph 72 of the Order. Prior to this filing, Arthur Andersen met with members of the FCC Staff to receive their input concerning the scope and arrangements for the review. Comments from the meeting were incorporated into the work plan. A copy of the work plan filed with the FCC is included as Appendix 2 to this report.

### 3.2 Input from Interested Parties

A number of meetings were held between Arthur Andersen and interested parties to solicit input on the scope of the review and the format of the report. Such meetings are listed in Table 3A below.

**Table 3A**

Date	Meeting With	To Discuss
4/14/92	Switch vendors	SCIS/SCM disclosure issues
4/22/92-5/5/92	Each of the BOCs	Preliminary results of review
5/8/92	FCC Staff	Preliminary results of review
5/13/92	Intervenors	Scope of review and report format

As result of the May 13th meeting, intervenors were requested by the FCC to provide any comments and suggestions concerning the independent review of SCIS/SCM to Arthur Andersen. Copies of the letters received from the Ad Hoc Telecommunications Users Committee, AT&T, MCI and US Sprint are included as Appendix 3 to this report. Arthur Andersen carefully reviewed the



letters, discussed them with the FCC Staff and determined that each comment had been addressed in one of the following ways:

- o The review already incorporated the comment and no additional action was necessary.
- o The scope of the review was modified or expanded to reflect the comment.
- o The comment was beyond the scope of the review intended by the FCC and no additional action was taken.

### **3.3 Purpose of Review**

From the outset, there has been some apparent confusion concerning the nature of the independent review of SCIS/SCM. The FCC and other interested parties have, at various times, referred to the review as an "independent audit" or "examination" of SCIS/SCM.

The accounting profession gives precise meaning to the terms "audit" or "examination." An audit involves an engagement in which an independent public accountant renders an opinion on the fairness of presentation of financial statements or other information prepared in accordance with generally accepted accounting principles or some other authoritative basis. In order to render such an opinion, the accountant must perform appropriate tests and other procedures of the underlying accounting records, procedures and systems in conformity with generally accepted auditing standards established by the profession.

The nature of Arthur Andersen's engagement was not intended to be an "audit" of SCIS/SCM or the ONA cost support filed by the BOCs. Rather, it was a review by an independent public accounting firm of specific areas of SCIS and SCM and their application by the BOCs which was necessitated because of concerns about access to proprietary information. The rather generic term "review" was used to encompass the following four areas of work performed by Arthur Andersen:

- o An evaluation of SCIS/SCM methodology
- o The identification of model parameters subject to individual variation among the BOCs
- o Sensitivity analyses of significant model parameters
- o Validation the BOCs' methodologies for aggregating SCIS/SCM output

### **3.4 Scope of Review**

The scope of the independent review ultimately was based on a combination of the FCC's general guidance in the SCIS Disclosure Order, input received from interested parties and the judgment of Arthur Andersen as to the most meaningful way to implement such direction. The independent